

## Design Decisions Linked to Long-Term Consequences in Water Well Operation

In business as in personal life, one's decisions often have long-term consequences; some are positive while others are negative. The same can be said for water well design decisions made by water utilities in both developed and developing nations. One key example is the way in which water utilities plan, budget and construct major capital improvements. In developed nations, water utilities weigh the risks and rewards of most projects. Criteria for performance, durability and efficiency rank highly and are serious considerations in the budgeting process. Naturally, cost is important but it is evaluated in the context of the long-term matters. In contrast, water utilities in developing nations tend to focus principally upon the initial capital cost. Performance and efficiency are all-too-often de-emphasized. Some utilities in developing nations are pointed in their remarks that cost is the most important criterion and that it trumps quality (Fig 1).

While the differences in the decision making between developed and developing nations are understandable, the truth is that capital improvements are long-term investments and need to be considered as such. A good example is the design and construction of a potable water supply well for a water utility. Water wells are the cornerstones for many water utilities. They make it possible to provide water service where it is needed. When properly designed municipal wells should be operational for decades if routinely maintained. Yet, many utility managers look to construct new wells at the lowest possible cost and choose cheap, poor quality casing and well screen that are destined to be marginally useful and inefficient.

In the short-term, the designer that thinks only of today's cost is likely to succeed in completing well construction at the least cost. But, what are the long-term consequences of that cost-first approach? In the case of well casing and screen (arguably the most important components of a water supply well), selecting casing and screen on the basis of lowest cost leads to poor quality wells. Poor quality wells corrode quickly, are prone to structural failure, and are inefficient. Moreover, they most definitely will cost the utility more in operating costs. In contrast, the well constructed with efficient well screens and corrosion-resistant steel will operate for decades, do so at less cost, and pay for itself by the savings in electrical power.

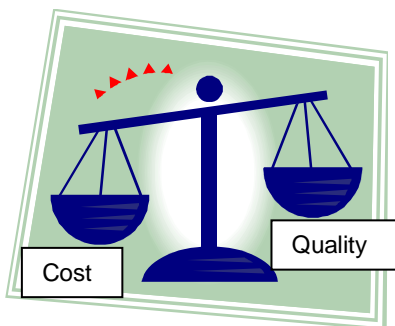


Fig. 1

Many water utilities in developing nations look to well drilling contractors to make well design decisions for them. It becomes the contractor's task to select the type of steel casing, its wall thickness, its diameter, and the type of well screen. The contractor that is given such latitude

naturally seeks out the lowest cost casing and slotted pipe available to tender a winning bid. The utility gets a low cost well and saddles itself with poor performance, inefficiency, and short service life. Unfortunately, this scenario is played out over and over. Stockpiles of left-over corroded, low-grade steel casing and ragged, saw-cut slotted pipe can be seen in the storage areas of most utilities (Fig. 2). As it corrodes in the yard, it testifies to the performance of the materials that were used in the well construction.



Fig. 2 – Left over, rusted, thin-walled, saw-cut pipe

Low-carbon steel, slotted pipe used as well screen, while functional in the short term, can be counted upon to corrode and clog (Fig. 3). Downhole photos of low-carbon steel in existing water wells show that slots clog, casing corrodes, and failures occur in relatively short time. Clogged slots lead to declining production, well losses, more drawdown, and higher pumping costs. These results can be avoided during the design period if well designers choose to do so.



Fig. 3 – Clogged slots

Sound decisions for water well design begin with an understanding that quality pays dividends. Therefore, it is vital for water utilities and their well designers to begin to think of

each new well as an investment. A basic tenet for water utilities in developing nations should be that efficient and durable water wells always operate at less cost. Another tenet is that “you get what you pay for”. Quality costs and it matters. For the water utility, having wells that last longer and cost less to operate will allow it to invest in other capital improvements in the water system. In the end, everyone benefits.

**About the Author**

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